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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,794	03/11/2004	David L. Dickerson	MI22-2500	8299

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EXAMINER

MAI, ANH D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 02/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/799,794

Applicant(s)

DICKERSON ET AL.

Examiner

Anh D. Mai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 49-69 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 63-69 is/are allowed.
- 6) ☒ Claim(s) 49-62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/11/2004 ; 11/16/004 ; 11/23/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### *Status of the Claims*

1. Amendment filed January 14, 2005 has been entered. Claim 58 has been amended.  
Claims 49-69 are pending.

### *Election/Restrictions*

2. In the Election filed January 14, 2005, Applicant has elected species #4, as directed to Figs. 26-29, and indicated that all pending claims 49-69 read on species #4.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 53 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation “the method further comprises extending the opening into the semiconductor substrate after the etching of the portion of the sidewall” (as recited in the new claim 53) in the application as filed.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 49-52 and 54-62 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsai et al. (U.S. Patent No. 5,712,185) of record.

Tsai teaches a semiconductive processing method as claimed including:

forming a masking layer (32/34) over a semiconductive substrate (30);

forming an opening (38) through the masking layer and partially into the semiconductive substrate (30), the masking layer comprises a sidewall formed along a periphery of the opening (38); and

etching a portion of the sidewall to leave a first segment (32A) of the sidewall substantially unchanged and to form a second segment (34B) of the sidewall laterally spaced from and elevationally above the first segment (32A), the second segment (34B) being substantially parallel with the first segment (32A). (See Figs. 3A-E).

With respect to claim 50, the method of Tsai further comprises oxidizing the semiconductive substrate to form an oxide (39) beneath the first segment (32A), the oxide (39) inherently lifting the first segment (32A) away from the semiconductive substrate (30).

For the inherency, see AAPA Fig. 5, page 3, line 22-page 4, line 3).

With respect to claim 51, the method of Tsai further comprises oxidizing the semiconductive substrate (30) to form an oxide (39) within the opening (38) and beneath the first segment (32A), the oxide (39) inherently lifting the first segment (32A) away from the semiconductive substrate (30) and partially filling the opening (38).

For the inherency, see AAPA Fig. 5, page 3, line 22-page 4, line 3).

With respect to claim 52, the etching of the portion of the sidewall of Tsai comprises utilizing phosphoric acid.

With respect to claim 54, the method of Tsai further comprises filling the opening (38) with insulative material (40).

With respect to claim 55, the masking layer of Tsai comprises silicon nitride.

With respect to claim 56, Tsai teaches a semiconductive processing method as claimed including:

- forming a masking layer (32/34) over a semiconductive substrate (30);

- forming an opening (38) through the masking layer and partially into the semiconductive substrate (30), the masking layer comprising a sidewall formed along a periphery of the opening (38); and

- etching a portion of the sidewall, the etching comprises:

  - forming a first segment (32A) of the sidewall substantially unchanged;

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forming a second segment (34B) of the sidewall laterally spaced from and elevationally above the first segment (32A); and

forming a third segment being formed between and connecting the first and second segments at respective right angles. (See Figs. 3A-E).

With respect to claim 57, the third segment of Tsai comprises an exposed upper surface of the masking layer. (See Fig. 3E).

With respect to claim 58, the etching of the portion of the sidewall of Tsai further comprises performing a wet etch procedure.

With respect to claim 59, the third segment of Tsai comprises an exposed upper surface elevationally below an uppermost surface of the of the masking layer, and further comprises forming another masking layer (36A) over the uppermost surface.

With respect to claim 60, the method of Tsai further comprises oxidizing the semiconductive substrate (30) to form an oxide (39) beneath the first segment (32A), the oxide (39) inherently lifting the first segment (39) away from the semiconductive substrate (30).

For the inherency, see AAPA Fig. 5, page 3, line 22-page 4, line 3).

With respect to claim 61, the masking layer of Tsai comprises silicon nitride.

With respect to claim 62, the method of Tsai further comprises filling the opening (38) in the semiconductive substrate (30) with insulative material (40).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai '185 as applied to claim 49 above, and further in view of Applicant Admitted Prior Art (hereinafter AAPA).

As best understood by the examiner, Tsai forming the opening (38) through the masking layer and partially into the semiconductor substrate.

Thus, Tsai is shown to teach all the features of the claim with the exception of further extending the opening into the semiconductor substrate after the initial etching.

However, AAPA, Figs. 3-4, teaches: following the initial forming the opening, trench (20) is further extended to form a deeper trench.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to further extend the opening of Tsai to a deeper depth as taught by AAPA to form a trench of a desire depth.

***Allowable Subject Matter***

6. Claims 63-69 are allowed.

7. The following is an examiner's statement of reasons for allowance: prior art of record fails to teach a semiconductive processing method in the combination of the limitations as

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claimed including: following the formation of the opening partially into the semiconductor substrate utilizing first and second masking layers, etching the sidewall of the second masking layer laterally from the opening and exposing the upper surface portion of the first masking layer; and etching the upper surface portion of the first masking layer to leave a first segment of the sidewall of the first masking layer substantially unchanged and to form a second segment of the sidewall of the first masking layer which is aligned with the second sidewall of the second masking layer.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (571) 272-1710. The examiner can normally be reached on 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished



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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Anh D. Mai', with a long horizontal flourish extending to the right.

Anh D. Mai

February 9, 2009